

What is claimed is:

1. A substrate treating method for performing a series of substrate treating processes to form a pattern on a substrate
5 by forming a coating film of a chemically amplified photore-
sist on the substrate, exposing the substrate having the
coating film formed thereon, and developing the exposed
substrate, said method comprising the steps of:
controlling a substrate treating condition relating to
10 acid diffusion that influences spread of an acid produced in
said coating film by exposure of said coating film, according
to a pivotal shift which is a difference between an actual
pattern size and a mask pattern size, said actual pattern
size being obtained from a processing carried out at a pivotal
15 point which is an exposing condition resulting in little varia-
tion in pattern size even with variations in focus of exposing
light; and
performing said series of substrate treating processes
based on said substrate treating condition relating to acid
20 diffusion as controlled.
2. A substrate treating method as defined in claim 1,
wherein said substrate treating condition relating to acid
diffusion is a substrate treating condition relating to
25 pre-exposure heating that influences heating of the coating

film before said exposure.

3. A substrate treating method as defined in claim 1,
wherein said substrate treating condition relating to acid
5 diffusion is a substrate treating condition relating to
post-exposure heating that influences heating of the coating
film after said exposure.

4. A substrate treating method as defined in claim 2,
10 wherein said substrate treating condition relating to
pre-exposure heating is a heating time of the coating film
before said exposure, said series of substrate treating proc-
esses being performed based on said heating time as con-
trolled.

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5. A substrate treating method as defined in claim 2,
wherein said substrate treating condition relating to
pre-exposure heating is a heating temperature of the coating
film before said exposure, said series of substrate treating
20 processes being performed based on said heating tempera-
ture as controlled.

6. A substrate treating method as defined in claim 3,
wherein said substrate treating condition relating to
25 post-exposure heating is a heating time of the coating film

after said exposure, said series of substrate treating processes being performed based on said heating time as controlled.

5 7. A substrate treating method as defined in claim 3,
wherein said substrate treating condition relating to
post-exposure heating is a heating temperature of the
coating film after said exposure, said series of substrate
treating processes being performed based on said heating
10 temperature as controlled.

8. A substrate treating method as defined in claim 1,
wherein said substrate treating condition relating to acid
diffusion is controlled to reduce said pivotal shift to zero.

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9. A substrate treating method for performing a series of
substrate treating processes to form a pattern on a substrate
by forming a coating film of a chemically amplified photore-
sist on the substrate, exposing the substrate having the
20 coating film formed thereon, and developing the exposed
substrate, said method comprising the steps of:

controlling a substrate treating condition relating to
dissolving rate that influences a dissolving rate of said coat-
ing film by development, according to a pivotal shift which is
25 a difference between an actual pattern size and a mask

pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light; and

5 performing said series of substrate treating processes based on said substrate treating condition relating to dissolving rate as controlled.

10 10. A substrate treating method as defined in claim 9, wherein said substrate treating condition relating to dissolving rate is a temperature in a developing atmosphere, said series of substrate treating processes being performed based on said temperature as controlled.

15 11. A substrate treating method as defined in claim 9, wherein said substrate treating condition relating to dissolving rate is a humidity in a developing atmosphere, said series of substrate treating processes being performed based on said humidity as controlled.

20 12. A substrate treating method as defined in claim 9, wherein said substrate treating condition relating to dissolving rate is a concentration of a developing solution, said series of substrate treating processes being performed based
25 on said concentration as controlled.

13. A substrate treating method as defined in claim 9,
wherein said substrate treating condition relating to dissolv-
ing rate is a temperature of a developing solution, said
series of substrate treating processes being performed based
5 on said temperature as controlled.

14. A substrate treating method as defined in claim 9,
wherein said substrate treating condition relating to dissolv-
ing rate is a developing time, said series of substrate
10 treating processes being performed based on said developing
time as controlled.

15. A substrate treating method as defined in claim 9,
wherein said substrate treating condition relating to dissolv-
15 ing rate is controlled to reduce said pivotal shift to zero.

16. A substrate treating method for performing a series of
substrate treating processes to form a pattern on a substrate
by forming a coating film of a chemically amplified photore-
20 sist on the substrate, exposing the substrate having the
coating film formed thereon, and developing the exposed
substrate, said method comprising the steps of:

controlling a substrate treating condition relating to
acid diffusion that influences spread of an acid produced in
25 said coating film by exposure of said coating film, according

to a pivotal shift which is a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light, and controlling a substrate treating condition relating to dissolving rate that influences a dissolving rate of said coating film by development, according to said pivotal shift; and

performing said series of substrate treating processes based on said substrate treating condition relating to acid diffusion and said substrate treating condition relating to dissolving rate as controlled.

17. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to acid diffusion is a substrate treating condition relating to pre-exposure heating that influences heating of the coating film before said exposure.

18. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to acid diffusion is a substrate treating condition relating to post-exposure heating that influences heating of the coating film after said exposure.

19. A substrate treating method as defined in claim 17,
wherein said substrate treating condition relating to
pre-exposure heating is a heating time of the coating film
before said exposure, said series of substrate treating proc-
5 esses being performed based on said heating time as con-
trolled.

20. A substrate treating method as defined in claim 17,
wherein said substrate treating condition relating to
10 pre-exposure heating is a heating temperature of the coating
film before said exposure, said series of substrate treating
processes being performed based on said heating tempera-
ture as controlled.

15 21. A substrate treating method as defined in claim 18,
wherein said substrate treating condition relating to
post-exposure heating is a heating time of the coating film
after said exposure, said series of substrate treating proc-
esses being performed based on said heating time as con-
20 trolled.

22. A substrate treating method as defined in claim 18,
wherein said substrate treating condition relating to
post-exposure heating is a heating temperature of the
25 coating film after said exposure, said series of substrate

treating processes being performed based on said heating temperature as controlled.

23. A substrate treating method as defined in claim 16,
5 wherein said substrate treating condition relating to dissolving rate is a temperature in a developing atmosphere, said series of substrate treating processes being performed based on said temperature as controlled.

10 24. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to dissolving rate is a humidity in a developing atmosphere, said series of substrate treating processes being performed based on said humidity as controlled.

15 25. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to dissolving rate is a concentration of a developing solution, said series of substrate treating processes being performed based
20 on said concentration as controlled.

26. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to dissolving rate is a temperature of a developing solution, said
25 series of substrate treating processes being performed based

on said temperature as controlled.

27. A substrate treating method as defined in claim 16,
wherein said substrate treating condition relating to dissolv-
5 ing rate is a developing time, said series of substrate
treating processes being performed based on said developing
time as controlled.

28. A substrate treating method as defined in claim 16,
10 wherein said substrate treating condition relating to acid
diffusion is controlled to reduce said pivotal shift to zero.

29. A substrate treating method as defined in claim 16,
wherein said substrate treating condition relating to dissolv-
15 ing rate is controlled to reduce said pivotal shift to zero.

30. A substrate treating apparatus for performing a series
of substrate treating processes to form a pattern on a sub-
strate by forming a coating film on the substrate, exposing
20 the substrate having the coating film formed thereon, and
developing the exposed substrate, said apparatus
comprising:

switching means for selecting whether to set a sub-
strate treating condition according to a pivotal shift which is
25 a difference between an actual pattern size and a mask

pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light;

5 wherein said series of substrate treating processes is performed based on said substrate treating condition selected or a substrate treating condition deselected by said switching means.

10 31. A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus
15 comprising:

 substrate treating condition selecting means for selecting one substrate treating condition from a plurality of substrate treating conditions of the same type; and

 correlation storage means for storing correlations
20 between a plurality of substrate treating conditions, a pivotal shift which is a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in
25 pattern size even with variations in focus of exposing light, a

substrate treating conditions relating to acid diffusion that influences spread of an acid produced in said coating film by exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences a
5 dissolving rate of said coating film by development;
wherein said series of substrate treating processes is performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said correlation storage
10 means.

32. A substrate treating apparatus as defined in claim 31, wherein said type relates to a coating solution for forming said coating film on the substrate.

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33. A substrate treating apparatus as defined in claim 31, wherein said type relates to pattern size.

34. A substrate treating apparatus as defined in claim 31,
20 wherein said type relates to pattern form.

35. A substrate treating apparatus as defined in claim 31, wherein, after performing said series of substrate treating processes based on said correlation read from said
25 correlation storage means, results of the processes are

stored in said correlation storage means, to reflect said results of the processes on a next series of substrate treating processes.

- 5 36. A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus
- 10 comprising:
- type selecting means for selecting at least one type from different types of substrate treating conditions;
 - substrate treating condition selecting means for selecting one substrate treating condition from a plurality of
 - 15 substrate treating conditions of the same type selected by said type selecting means; and
 - correlation storage means for storing correlations between a plurality of substrate treating conditions, a pivotal shift which is a difference between an actual pattern
 - 20 size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light, a substrate treating condition relating to acid diffusion that
 - 25 influences spread of an acid produced in said coating film by

exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences a dissolving rate of said coating film by development;

wherein said series of substrate treating processes is
5 performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said correlation storage means.

10 37. A substrate treating apparatus as defined in claim 36, wherein said type relates to a coating solution for forming said coating film on the substrate.

38. A substrate treating apparatus as defined in claim 36,
15 wherein said type relates to pattern size.

39. A substrate treating apparatus as defined in claim 36, wherein said type relates to pattern form.

20 40. A substrate treating apparatus as defined in claim 36, wherein, after performing said series of substrate treating processes based on said correlation read from said correlation storage means, results of the processes are stored in said correlation storage means, to reflect said
25 results of the processes on a next series of substrate treating

processes.

41. A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing
5 the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus comprising:

switching means for selecting whether to set a substrate treating condition according to a pivotal shift which is
10 a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern
15 size even with variations in focus of exposing light;

substrate treating condition selecting means for selecting one substrate treating condition from a plurality of substrate treating conditions of the same type; and

correlation storage means for storing correlations
20 between a plurality of substrate treating conditions, said pivotal shift, a substrate treating condition relating to acid diffusion that influences spread of an acid produced in said coating film by exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences
25 a dissolving rate of said coating film by development;

wherein said series of substrate treating processes is performed based on said substrate treating condition selected or a substrate treating condition deselected by said switching means; and

5 wherein, when the substrate treating conditions are switched by said switching means, said series of substrate treating processes is performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said
10 correlation storage means.

42. A substrate treating apparatus as defined in claim 41, wherein said type relates to a coating solution for forming said coating film on the substrate.

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43. A substrate treating apparatus as defined in claim 41, wherein said type relates to pattern size.

44. A substrate treating apparatus as defined in claim 41,
20 wherein said type relates to pattern form.

45. A substrate treating apparatus as defined in claim 41, wherein, after performing said series of substrate treating processes based on said correlation read from said
25 correlation storage means, results of the processes are

stored in said correlation storage means, to reflect said results of the processes on a next series of substrate treating processes.

5 46. A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus

10 comprising:

 switching means for selecting whether to set a substrate treating condition according to a pivotal shift which is a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an

15 exposing condition resulting in little variation in pattern size even with variations in focus of exposing light;

 type selecting means for selecting at least one type from different types of substrate treating conditions;

20 substrate treating condition selecting means for selecting one substrate treating condition from a plurality of substrate treating conditions of the same type selected by said type selecting means; and

 correlation storage means for storing correlations

25 between a plurality of substrate treating conditions, said

pivotal shift, a substrate treating condition relating to acid diffusion that influences spread of an acid produced in said coating film by exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences
5 a dissolving rate of said coating film by development;

wherein said series of substrate treating processes is performed based on said substrate treating condition selected or a substrate treating condition deselected by said switching means; and

10 wherein, when the substrate treating conditions are switched by said switching means, said series of substrate treating processes is performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said
15 correlation storage means.

47. A substrate treating apparatus as defined in claim 46, wherein said type relates to a coating solution for forming said coating film on the substrate.

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48. A substrate treating apparatus as defined in claim 46, wherein said type relates to pattern size.

49. A substrate treating apparatus as defined in claim 46,
25 wherein said type relates to pattern form.

50. A substrate treating apparatus as defined in claim 46,
wherein, after performing said series of substrate treating
processes based on said correlations read from said correla-
5 tion storage means, results of the processes are stored in
said correlation storage means, to reflect said results of the
processes on a next series of substrate treating processes.